

Claim Listing

1. (Original) A method of processing a run of workpieces, the method comprising the steps of:
  - providing a database comprising subgroups of data representing characteristics from previously processed workpieces;
  - selecting a first subgroup of data having characteristics that satisfy a predetermined criteria;
  - determining processing conditions for a processing tool corresponding to the first subgroup of data;
  - processing the run of workpieces with the process tool using the determined processing conditions; and
  - measuring the run of workpieces according to a sampling rate determined from the first subgroup of data.
2. (Original) The method of claim 1, wherein the characteristics include characteristics of the workpiece.
3. (Original) The method of claim 1, wherein the characteristics include characteristics of the process tool.

4. (Original) The method of claim 1, wherein the step of selecting a first subgroup of data includes the steps of:

applying a set of rules to the database such that each rule generates a unique subgroup of data, wherein the rules are ordered according to a confidence level; and  
determining a subgroup of data of at least a minimum size that yields a highest confidence level among all of the rules.

5. (Original) The method of claim 4, wherein the sampling rate is determined from a capability ratio calculated based on the rule used to generate the first subgroup of data.

6. (Original) The method of claim 5, wherein, after processing, the run of workpieces is tagged with the rule used to generate the first subgroup of data.

7. (Original) The method of claim 1, wherein the run of workpieces comprises a lot of semiconductor parts and the measuring step comprises a metrology process.

8. (Currently Amended) An advanced process control (APC) system, comprising:
- a data analysis system that determines a set of conditions ~~for~~ to be applied to a manufacturing process based on a subgroup of data identified from a historical database, wherein the subgroup of data is identified according to a selected rule;
  - a tagging system that associates a tag containing the selected rule to each product lot subjected to the manufacturing process; and
  - a sampling optimization system that examines the tag for each product lot processed and determines a metrology sampling rate based on the selected rule.
9. (Original) The APC system of claim 8, wherein the selected rule generates a subgroup of data of at least a minimum size that provides a highest possible confidence level for each of a set of rules.
10. (Original) The APC system of claim 9, further comprising a rule ordering system that orders the set of rules based on historic capability data for product lots processed with each rule.
11. (Original) The APC system of claim 9, further comprising a rule ordering system that orders the set of rules in real time by evaluating capability data for each rule using metrology data.
12. (Original) The APC system of claim 8, wherein the sampling rate is determined from a capability ratio Cpk calculated based on the selected rule.

13. (Original) The APC system of claim 12, wherein the Cpk is further calculated based on factors selected from the group consisting of: a process tool, a process, technology, part number, level, mask and operation.

14. (Original) A method for optimizing metrology sampling rates in an advanced process control (APC) application, comprising:

- calculating capability ratios (Cpk) for a product processed by each of a plurality of rules within a single APC process, wherein each Cpk calculation is based on an associated rule;

- calculating sampling rates for each calculated Cpk;

- processing a run of the product using a selected rule;

- tagging the run of the product after processing with the selected rule; and

- determining a metrology sampling rate for the run based on the selected rule.

15. (Original) The method of claim 14, comprising the further steps of:

- processing a second run of the product using a second selected rule;

- tagging the second run of the product after processing with the second selected rule; and

- determining a metrology sampling rate for the second run based on the second selected rule.

16. (Original) The method of claim 14, wherein the selected rule is selected from a set of ordered rules that identify subgroups of data from a historical database.

17. (Original) The method of claim 16, wherein the selected rule generates a subgroup of at least a minimum size that yields a highest possible confidence level.

18. (Original) The method of claim 16, comprising the further step of reordering the set of rules based on historic capability data for product processed with each rule.

19. (Original) The method of claim 16, comprising the further step of reordering the set of rules in real time by evaluating capability data for each rule using metrology data.

20. (Original) The method of claim 14, wherein the Cpk is further calculated based on factors selected from the group consisting of: a process tool, a process, technology, part number, level, mask and operation.

21. (Currently Amended) A program product stored on a recordable medium for optimizing an advanced process control (APC) system, comprising:

means for determining a set of conditions ~~for~~ to be applied to a manufacturing process based on a subgroup of data identified from a historical database, wherein the subgroup of data is identified according to a selected rule;

means for associating the determined set of conditions to a product lot subjected to the manufacturing process; and

means for examining the associated determined set of conditions for the product lot to determine a metrology sampling rate.

22. (Original) The program product of claim 21, wherein the associating means includes tagging the selected rule to the product lot.

23. (Original) The program product of claim 21, wherein the selected rule generates a subgroup of data of at least a minimum size that yields a highest possible confidence level for each of a set of rules.

24. (Original) The program product of claim 23, further comprising means for ordering the set of rules based on historic capability data for product lots processed with each rule.

25. (Original) The program product of claim 23, further comprising means for ordering the set of rules in real time by evaluating capability data for each rule using metrology data.

26. (Original) The program product of claim 21, wherein the sampling rate is determined from a capability ratio  $C_{pk}$  calculated based on the selected rule.